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EXAMINER	
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ART UNIT	PAPER NUMBER
2613	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/775,873	Applicant(s) ZHOU, QINGGANG	
	Examiner Andy S. Rao	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 6.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-15 and 24-36 are rejected under 35 U.S.C. 102(e) as being anticipated by Ward et al., (hereinafter referred to as "Ward").

Ward discloses an image processing circuit, comprising: a processor (Ward: figure 2) operable to receive a value of an original first video image and a value of an original pixel of an original second video image (Ward: 4, lines 15-20); generate a first pixel value component from the value of the original first video image (Ward: column 4, lines 1-5: "vertical and horizontal directions"); generate a second pixel value component from the original pixel of the second video image (Ward: column 4, lines 1-5: "temporal direction"); generate a value of a filler pixel from the first and second pixel value components (Ward: column 4, lines 6-13); and combine the filler pixel and the original first video image to generate resulting video image (Ward: column 4, lines 35-40), as in claim 1.

Regarding claim 2, Ward discloses that the original second image follows the original first image in a sequence (Ward: column 1, lines 5-35), as in the claim.

Regarding claim 3, Ward discloses that that the first image comprises an original field (Ward: column 1, lines 5-35); and the processor is operable to generate the resulting video by generating a filler field that includes the filler pixel and that is complimentary to the original field, and merging the original and filler fields (Ward: column 4, lines 35-40), as in the claim.

Regarding claim 4, Ward discloses that that the first image comprises an original field (Ward: column 1, lines 5-35) that includes the original pixel of the original first video image (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) that includes the original pixel of the second video image (Ward: column 4, lines 1-5: "temporal direction"); and the processor is

operable to generate the resulting video by generating a filler field that includes the filler pixel and that is complimentary to the first and second original fields (Ward: column 1, lines 15-20), and merging the original and filler fields (Ward: column 4; lines 35-40), as in the claim.

Regarding claim 5, Ward discloses generating the first pixel value component equal to the value of the original pixel of the original first video image, and generates the second pixel value component equal to the value of the original pixel of the original second video image (Ward: column 4, lines 15-25), as in the claim.

Regarding claim 6, Ward discloses weighting the first and second pixel value components (Ward: column 4, lines 30-35), as in the claim.

Regarding claim 7, Ward discloses generating a motion value form the values of the original pixels of the original first and second images (Ward: column 4, lines 55-67); and using the motion values to generate the first and second weighting factors (Ward: column 4, lines 30-35), as in the claim.

Ward discloses an image processing circuit, comprising: a processor (Ward: figure 2) operable to receive a value of an original first video image and a value of an original pixel of an original second video image (Ward: 4, lines 15-20) that follows the first image (Ward: column 1, lines 5-35); generate a motion value from a first filler video image from the values of the original pixels of the first and second original video images (Ward: column 4, lines 55-67); cause the motion value to indicate motion for a predetermined number of filler video images following the first filler video image if the motion value indicates motion respect to the first filler video image (Ward: column 5, liens 1-12), as in claim 8.

Regarding claim 9, Ward discloses generating the motion value equal to a difference between the values of the original pixels of the first and second original video images (Ward: column 4, lines 20-25), as in the claim.

Regarding claim 10, Ward discloses that the predetermined number is five (Ward: column 3, lines 1-15), as in the claim.

Regarding claim 11, Ward discloses that the motion value indicates motion if the motion value equals a non-zero number (Ward: column 5, lines 17-20), as in the claim.

Regarding claim 12, Ward discloses generating raw motion values from the values of the for the first filler video image from the values of the original pixels from and second original video images (Ward: column 4, lines 55-67); and filtering the raw motion value to generate the motion value (Ward: column 4, lines 30-35), as in the claim.

Regarding claim 13, Ward discloses that that the first video image comprises a first original field (Ward: column 1, lines 5-35) having a first polarity (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) having a same polarity as the first original video field (Ward: column 4, lines 1-5: "temporal direction"), as in the claim.

Regarding claim 14, Ward discloses that the first original video image and the original video images following the first original video image compose a sequence of original video images that includes the second original video and a third original video image located between the first and second original video images (Ward: column 1, lines 5-35), as in the claim.

Regarding claim 15, Ward discloses that the first original video image and the original video images following the first original video image compose a sequence of original video

images that includes the second original video and a third original video image located between the first and second original video images (Ward: column 1, lines 5-35); the first original video image comprises a first original field (Ward: column 1, lines 5-35) having a first polarity (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) having a same polarity as the first original video field (Ward: column 4, lines 1-5: "temporal direction"); and the third original video image comprises a third original video field having a polarity opposite to the polarities of the first and second original video fields (Ward: column 1, lines 5-35), as in the claim.

Ward discloses an method, comprising: generating a first pixel value component from the value of the original first video image (Ward: column 4, lines 1-5: "vertical and horizontal directions"); generating a second pixel value component from the original pixel of the second video image (Ward: column 4, lines 1-5: "temporal direction"); generating a value of a filler pixel from the first and second pixel value components (Ward: column 4, lines 6-13); and generating the filler pixel and the original first video image by combining resulting video image (Ward: column 4, lines 35-40), as in claim 24.

Regarding claim 25, Ward discloses that the original second image follows the original first image in a sequence (Ward: column 1, lines 5-35), as in the claim.

Regarding claim 26, Ward discloses that that the first image comprises an original field (Ward: column 1, lines 5-35); and generating the resulting video by generating a filler field that includes the filler pixel and that is complimentary to the original field, and combining the original and filler fields (Ward: column 4, lines 35-40), as in the claim.

Regarding claim 27, Ward discloses that that the first image comprises an original field (Ward: column 1, lines 5-35) that includes the original pixel of the original first video image (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) that includes the original pixel of the second video image (Ward: column 4, lines 1-5: "temporal direction"); and generating the resulting video by generating a filler field that includes the filler pixel and that is complimentary to the first and second original fields (Ward: column 1, lines 15-20), and combining the original and filler fields (Ward: column 4, lines 35-40), as in the claim.

Regarding claim 28, Ward discloses generating the first pixel value component equal to the value of the original pixel of the original first video image, and generating the second pixel value component equal to the value of the original pixel of the original second video image (Ward: column 4, lines 15-25), as in the claim.

Regarding claim 29, Ward discloses weighting the first and second pixel value components (Ward: column 4, lines 30-35), as in the claim.

Regarding claim 30, Ward discloses generating a motion value form the values of the original pixels of the original first and second images (Ward: column 4, lines 55-67); and using the motion values to generate the first and second weighting factors (Ward: column 4, lines 30-35), as in the claim.

Ward discloses a method, comprising: generating a motion value from a first filler video image from the values of the original pixels of the first and second original video images (Ward: column 4, lines 55-67); causing the motion value to indicate motion for a predetermined number

of filler video images following the first filler video image if the motion value indicates motion respect to the first filler video image (Ward: column 5, liens 1-12), as in claim 31.

Regarding claim 32, Ward discloses generating the motion value equal to a difference between the values of the original pixels of the first and second original video images (Ward: column 4, lines 20-25), as in the claim.

Regarding claim 33, Ward discloses that the predetermined number is five (Ward: column 3, lines 1-15), as in the claim.

Regarding claim 34, Ward discloses that the motion value indicates motion if the motion value equals a non-zero number (Ward: column 5, lines 17-20), as in the claim.

Regarding claim 35, Ward discloses generating raw motion values from the values of the for the first filler video image from the values of the original pixels from and second original video images (Ward: column 4, lines 55-67); and filtering the raw motion value to generate the motion value (Ward: column 4, lines 30-35), as in the claim.

Regarding claim 36, Ward discloses that that the first video image comprises a first original field (Ward: column 1, lines 5-35) having a first polarity (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) having a same polarity as the first original video field (Ward: column 4, lines 1-5: "temporal direction"), as in the claim.

Regarding claim 37, Ward discloses that the first original video image and the original video images following the first original video image compose a sequence of original video images that includes the second original video and a third original video image located between the first and second original video images (Ward: column 1, lines 5-35), as in the claim.

Regarding claim 38, Ward discloses that the first original video image and the original video images following the first original video image compose a sequence of original video images that includes the second original video and a third original video image located between the first and second original video images (Ward: column 1, lines 5-35); the first original video image comprises a first original field (Ward: column 1, lines 5-35) having a first polarity (Ward: column 4, lines 1-5: "horizontal and vertical directions"); the second video image comprises a second original field (Ward: column 1, lines 5-35) having a same polarity as the first original video field (Ward: column 4, lines 1-5: "temporal direction"); and the third original video image comprises a third original video field having a polarity opposite to the polarities of the first and second original video fields (Ward: column 1, lines 5-35), as in the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 16-23 and 37-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ward et al., (hereinafter referred to as "Ward") in view of Gupta et al., (hereinafter referred to as "Gupta").

Ward discloses an image processing circuit, comprising: a processor (Ward: figure 2) operable to receive first and second sets of pixels values of first and second groups of pixels in a video image (Ward: 4, lines 15-20); generate values (Ward: column 4, lines 55-67) from the first

(Ward: column 4, lines 1-5: "vertical and horizontal directions") and second (Ward: column 4, lines 1-5: "temporal direction") sets of pixels values for a filler pixel (Ward: column 4, lines 6-13) disposed in the video image between the first and second groups of pixels (Ward: column 1, lines 5-35); and generating a value for the filler pixel based on the values (Ward: column 4, lines 35-40), as in claim 16. However, Ward fails to disclose that the values are direction values as in the claims, although it does suggest interpolation according to edge orientation (Ward: column 5, lines 20-45). Gupta discloses the use of edge direction values for controlling interpolation of pixels (Gupta: column 18, lines 20-67; column 19, lines 1-45) in order to mitigate blocking artifacts in MPEG based coding (Gupta: column 20, lines 15-20). Accordingly, given this teaching of Gupta, it would have obvious for one of ordinary skill in art to incorporate Gupta's edge direction value generation for interpolation into the Ward apparatus in order to mitigate blocking artifacts in Ward's MPEG coded image (Gupta: column 4, lines 50-55; column 5, lines 5-12). The Ward apparatus, now incorporating Gupta's edge direction value generation, has all of the features of claim 16.

Regarding claim 17, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses has the first and second groups of the pixels respectively include three horizontally aligned pixels, the pixels of the first group are vertically aligned with the respective pixels of the second group, and the filler pixel is vertically aligned with a center pixel of the first group and a center pixel of the second group (Ward: column 4, lines 1-30), as in the claim.

Regarding claim 18, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses the first and second groups of the pixels respectively include left, center, and right horizontally aligned pixels; and the processor (Ward: figure 2) is operable to generate

to generate direction values as specified (Gupta: column 18, lines 20-67; column 19, lines 1-45), as in the claim.

Regarding claim 19, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses generating the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 20, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses generating an average pixel value (Ward: column 3, lines 10-15) for the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 21, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses has the first and second groups of the pixels respectively include three horizontally aligned pixels, the pixels of the first group are vertically aligned with the respective pixels of the second group, and the filler pixel is vertically aligned with a center pixel of the first group and a center pixel of the second group (Ward: column 4, lines 1-30), and the processor is able to generate the value of the filler pixel equal to an average of the values of the center pixels (Ward: column 3, lines 10-15) if all the direction values are greater than a predetermined threshold (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 22, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses generating an average pixel value (Ward: column 3, lines 10-15) for the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40); and discloses generating an average (Ward: column 3, lines 10-15) of predetermined ones of the pixel values (Ward: column 4, lines 33-37) for the filler pixel

value (Ward: column 4, lines 1-30) if the smallest one of the direction values is greater than the predetermined threshold (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 23, the Ward apparatus, now incorporating Gupta's edge direction value generation, discloses generating the direction value equal to a difference between the values of the original pixels of the first and second original video images (Ward: column 4, lines 20-25), as in the claim.

Ward discloses a method, comprising: generating values (Ward: column 4, lines 55-67) from the first (Ward: column 4, lines 1-5: "vertical and horizontal directions") and second (Ward: column 4, lines 1-5: "temporal direction") sets of pixels values for a filler pixel (Ward: column 4, lines 6-13) disposed in the video image between the first and second groups of pixels (Ward: column 1, lines 5-35); generating a value for the filler pixel based on the values (Ward: column 4, lines 35-40), as in claim 16. However, Ward fails to disclose that the values are direction values as in the claims, although it does suggest interpolation according to edge orientation (Ward: column 5, lines 20-45). Gupta discloses the use of edge direction values for controlling interpolation of pixels (Gupta: column 18, lines 20-67; column 19, lines 1-45) in order to mitigate blocking artifacts in MPEG based coding (Gupta: column 20, lines 15-20). Accordingly, given this teaching of Gupta, it would have obvious for one of ordinary skill in art to incorporate Gupta's edge direction value generation for interpolation into the Ward method in order to mitigate blocking artifacts in Ward's MPEG coded image (Gupta: column 4, lines 50-55; column 5, lines 5-12). The Ward method, now incorporating Gupta's edge direction value generation, has all of the features of claim 37.

Regarding claim 38, the Ward method, now incorporating Gupta's edge direction value generation, discloses has the first and second groups of the pixels respectively include three horizontally aligned pixels, the pixels of the first group are vertically aligned with the respective pixels of the second group, and the filler pixel is vertically aligned with a center pixel of the first group and a center pixel of the second group (Ward: column 4, lines 1-30), as in the claim.

Regarding claim 39, the Ward method, now incorporating Gupta's edge direction value generation, discloses the first and second groups of the pixels respectively include left, center, and right horizontally aligned pixels; and the processor (Ward: figure 2) is operable to generate to generate direction values as specified (Gupta: column 18, lines 20-67; column 19, lines 1-45), as in the claim.

Regarding claim 40, the Ward method, now incorporating Gupta's edge direction value generation, discloses generating the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 41, the Ward method, now incorporating Gupta's edge direction value generation, discloses generating an average pixel value (Ward: column 3, lines 10-15) for the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 42, the Ward method, now incorporating Gupta's edge direction value generation, discloses has the first and second groups of the pixels respectively include three horizontally aligned pixels, the pixels of the first group are vertically aligned with the respective pixels of the second group, and the filler pixel is vertically aligned with a center pixel of the first group and a center pixel of the second group (Ward: column 4, lines 1-30), and the processor is

able to generate the value of the filler pixel equal to an average of the values of the center pixels (Ward: column 3, lines 10-15) if all the direction values are greater than a predetermined threshold (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 43, the Ward method, now incorporating Gupta's edge direction value generation, discloses generating an average pixel value (Ward: column 3, lines 10-15) for the filler pixel value (Ward: column 4, lines 1-30) from the smallest one of the direction values (Gupta: column 19, lines 30-40); and discloses generating an average (Ward: column 3, lines 10-15) of predetermined ones of the pixel values (Ward: column 4, lines 33-37) for the filler pixel value (Ward: column 4, lines 1-30) if the smallest one of the direction values is greater than the predetermined threshold (Gupta: column 19, lines 30-40), as in the claim.

Regarding claim 44, the Ward method, now incorporating Gupta's edge direction value generation, discloses generating the direction value equal to a difference between the values of the original pixels of the first and second original video images (Ward: column 4, lines 20-25), as in the claim.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Naveen discloses chrominance resampling for color images. Lam discloses an image motion estimation system. Hoang discloses a method and apparatus for adaptive edge based scan line interpolation. Le Clerc discloses a method and apparatus for estimating the noise level in a video sequence. Walters discloses systems for adaptive deinterlacing. Bayazit discloses a method

and system for interpolating a missing pixel using a motion vector. Swan discloses a method and system for the interlacing/re-interlacing video on a display device.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (703)-305-4813. The examiner can normally be reached on Monday-Friday 8 hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris S. Kelley can be reached on (703)-305-4856. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andy S. Rao
Primary Examiner
Art Unit 2613

ANDY RAO
PRIMARY EXAMINER

asr
April 8, 2004